

REMARKS

Applicant has reviewed the Office Action mailed on May 11, 2000 and all the references cited therewith.

Correction of noted defects in the Drawing will be deferred until the Application is allowed, as permitted by paragraph 3 of the Office Action.

Of the four references cited against the claims, only the patent to Simpson et al. falls within the same general category as that of the present invention. Only Simpson allows a user to specify and then interactively modify a proposed route plan in accordance with a display of hazards such as weather. The cited Dearth patent concerns an in-flight cockpit display for navigating in real time in the presence of substantially unchanging hazards such as control zones and physical obstacles. It is essentially an automated map. Possible weather hazards are presented only as a line of text on the geographic display in Dearth's Fig. 3. The Atlas patent is a real-time radar microburst detector. It has no route-planning function of any kind, and no display of routes or hazards whatsoever. The Adams patent is a navigation expert for determining a sequence of aircraft headings in real time to meet unanticipated contingencies (see col. 1 lines 21-24). Hazards are considered only to the extent that they are built into the "cost" of overflying particular point. Further, Adams has no display of any kind, neither for a route nor for any hazards. And the system is designed for situations where interactivity with the user pilot is out of the question for lack of time.

Within the category of interactive route-planning tools, it is not enough to assemble the relevant data or to present it in some form to the user. As emphasized on page 2 of the Specification, "merely providing additional hazard information would not adequately support effective decision-making for routing choices." That is, the data must be presented to a user in a form that facilitates making good intuitive choices among a large number of competing considerations. That is, ergonomic factors in displaying the data and receiving user input are not only desirable but absolutely necessary.

It is in this aspect that Simpson et al. fall short. The user can select a map (Fig. 3) for entering routing information. Then he can select a weather product and then one of several types of weather display: an alphanumeric listing (Fig. 5), a geographic map (Fig. 6), a visual altitude

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profile (Fig. 7), or a perspective pictorial (Fig. 8). None of these show the route and the weather hazards together. The route map cannot display weather hazards. None of the weather displays show the route. The user apparently must flip back and forth among them, retaining a mental image of the missing aspect.

Further, Simpson neither teach nor suggest any way to depict different types of weather or other hazards. As stated in the Application, different route planners care about different types of hazards. Freight and passengers feel differently about a little turbulence. The only display in which Simpson even consider different types of hazard is in the alphanumeric screen of Fig. 5, where they could possibly be listed together. This screen, however, is only a peephole that can show the total weather condition for one geographic location at a time. The route planner thus has no overall image of what lies along a proposed route, or how to eyeball a route around multiple areas of weather hazards, perhaps cutting across a low-intensity corner of a high-winds region in order to avoid a serious patch of icing somewhere else, while still getting the passengers there on time.

Planning a route interactively also requires allowing the user to see what is important to him, and, just as importantly, to eliminate data that is not important. In Simpson's system, none of the contents of any of the graphical weather screens can be modified by the user, such as to rejigger weather-area boundaries or to bury wind intensities below a desired threshold level.

Claims 1-4, 9, 12-14, 18-23, 27-29, 32-36, 38-39, 40-42, 44-46, 49, and 53-55 were rejected under 35 U.S.C. 103(a) as being unpatentable over Simpson et al. in view of Dearth.

Amended claim 1 expresses the patentable differences between the present invention and Simpson. For example, the displaying element of the claim recites that "geographic representations" of the route data and the hazard data are displayed "together in the same presentation." As noted above, Simpson present these two aspects of the planning data only in separate selectable displays, so that the user cannot view them at the same time. Claim 1 also recites that the hazards are of different types, the different types of hazards "being represented differently from each other." Simpson's displays merely represent weather generically, with no observable distinction being made among different types—or even between weather hazards and other forms of weather that do not present a hazard to the flight plan. Simpson have no

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indication or suggestion that any such distinction might be useful. Further, this reference presents all weather data in a way determined by the system. The user is limited to inputting specifications for the flight plan, but he cannot modify displayed representations of any portions "of the hazard data," such as area boundaries, selected types of hazard, threshold intensities, and so forth. This capability of permitting the user to see only what he wants to see, clearing out data that are unimportant to this particular user, and defining his own hazard areas, is of the highest ergonomic importance. Simpson simply have no suggestion of such a capability.

The secondary reference to Dearth cannot properly be combined with Simpson. As discussed above, Dearth is not a planning system for "a proposed route for a vehicle." It is a real-time in-cockpit navigational aid, not a prospective planning aid. Accordingly, there is no motivation for combining it with Simpson, except for hindsight reconstruction of the present invention.

But even an improper combination would not reach the clear and significant limitations of claim 1. Dearth is cited for showing multiple hazards in col. 1 lines 4-15. This combination still lacks the display of route data and hazard data in the same geographic presentation; Dearth does not display a route at all. Dearth has no suggestion of any means for modifying his displayed representations of data associated with at least some of "the hazards." Dearth's hazard data are fixed, so that a combination would still not provide a user with this important capability of the invention.

The amendment to claim 1 import a recitation from claim 10, which was rejected under a further combination with the Atlas reference. This patent is, first of all, improper, because Atlas has nothing to do with route planning; it is merely a microburst detector and nothing more. In addition, however, it does not suggest any way to display different hazards differently. In fact, it deals with only a single hazard, microburst turbulence. Atlas has no display, and does not suggest how even the single hard might be presented to a user. In short, Atlas contributes nothing to any aspect of claim 1.

Accordingly, claim 1 is clearly patentable over the prior art. Dependent claims 2-4, 9, and 12-14 incorporate all the limitations of claim 1, and present others as well. For example, claim 4 states that the input specifications include "boundaries of areas" for the hazards.

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Nowhere does either of the cited references hint at any ability of a *user* to input hazard boundaries. Article claim 18 has been amended to conform to method claim 1, and claims 19-20 depend therefrom.

Independent apparatus claim 21 has been similarly amended. The route and hazard data are presented “together.” The different types of hazards are “represented differently from each other.” The user input specifications have the capability of modifying displayed representations of “the hazards,” and not just the route data. Dependent claims 22-23, 27-29, and 32-36 incorporate the limitations of their parent, and add other significant recitations. Even an improper combination of Simpson, Dearth, and Atlas can thus not reach the totality of claim 21.

Claim 44 has also been amended in this way. The “proposed” route and the hazard data appear on the recited display “together geographically,” and not merely separately. “[M]ultiple types of weather hazards” are displayed in this manner; Simpson display weather only generically, and Dearth does not display weather geographically at all, much less several different types of weather hazards. The “user” controls manipulate characteristics of “the hazards.” Again, no combination of any of the cited references permits the user to affect characteristics such as area boundaries, intensity thresholds, and type selections of geographically displayed hazards. Claims 46 and 53-55 depend from this patentable claim. Claims 45 and 49 have been canceled as redundant.

Independent claim 38 has been amended somewhat differently. Here, the feature that distinguishes the present invention from any combination of the references is that the user inputs specifications of “area boundaries to be associated with the hazards,” and that the presenting means includes “geographic representations of ... the boundaries.” Simpson suggests no hazard area boundaries at all. Although Dearth can display items such as control-area boundaries, these are fixed, and are most certainly not input by the user of his system. As to the references cited against other claims, Atlas has no user display and no aspect that can be varied by a user at all. The Adams patent has no display, and does not present the cells of Fig. 2 to the user. The user certainly cannot modify the cells. In any event, the cell boundaries merely represent geographic areas of fixed size, and do not represent hazards. Dependent claims 39-42 are similarly patentable.

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Claims 6, 7, 10, 11, 25, 26, 30, 31, 48, and 50-51 were rejected under 35 U.S.C. 103(a) as unpatentable over Simpson et al. in view of Atlas alone.

First, it is difficult to understand how a dependent claim can logically be rejected upon a combination that excludes one of the references that the Office Action deemed necessary to reject its parent claim, because the dependent claim includes all of the parent's limitations.

Secondly, Atlas cannot be combined with any of the references cited in the Office Action to reach the totality of limitations in the rejected claims. As indicated previously, Atlas teaches a detector of one type of hazard, microbursts. His detector performs no routing or route-planning function, has no user display, and admits no user inputs for a display or for any other palpable purpose. The only way to intrude Atlas into any claim of the present invention is with hindsight knowledge of Applicant's contribution to the art. This is impermissible under 35 U.S.C. 103.

Moreover, Atlas adds nothing to the Simpson patent that is relevant to the rejected claims. Claims 6, 7, 25, and 26, and 48 recite that the specifications input by the user concern "motion" or "direction and speed" of one of the hazards. Atlas detects such quantities with respect to actual weather conditions, but most certainly does not permit a user to input them, as required in the parent claims 1, 21, and 44. Claims 10 and 30 have been canceled, but the shortcomings of Atlas with respect to their recitations that different hazard types are displayed differently are discussed above in connection with amended claims 1 and 21; the argument for claim 50 is the same. As to claims 11, 31, and 51 Atlas displays nothing, and thus cannot be germane to a recitation that "displayed hazard data" have different intensities. Atlas merely detects different wind intensities.

Claims 8, 15, 16, and 52 were rejected under 35 U.S.C. 103(a) as unpatentable over Simpson et al. in view of Dearth and Atlas.

Here again, there is no motivation to combine Atlas with Simpson and Dearth, because the systems of all three serve greatly different purposes, and both Dearth and Atlas differ in purpose from the present invention. And, again, even an improper combination of all three references does not reach the claims. Claims 8 and 15 incorporates all the limitations of their parent claim 1; as discussed at length above, this claim has at least three major recitations that are not shown in any combination of the cited references. As to claims 16 and 52, none of the

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references teaches that the user controls include any control to “establish a threshold for a hazard” to be avoided by a route, or that the “user can set” a number of thresholds for the hazards.

Claims 5, 17, 24, 37, 43, 47, 56, and 57 were rejected under 35 U.S.C. 103(a) as unpatentable over Simpson et al. in view of Adams et al.

Here again, it is difficult to understand how a dependent claim can logically be rejected upon a combination that excludes one of the references necessary to reject its parent.

Claims 5, 24, and 47 add to their parent claims recitations that the hazard boundaries “are polygons.” Most obviously, the cells of Adams Fig. 2 are not the boundaries of hazards. Instead, they merely represent geographic areas of some convenient size for the optimization algorithm, which requires some discrete size in order to solve a combinatorial problem; the size is chosen only for computational tractability. In addition, the parent claims of each of these claims requires that the boundaries are specifications that are input by a *user* of the system. Adams clearly specifies the boundaries upon design of the system, and the user pilot has no control over them—in fact, does not see them and is not aware of them. Accordingly, the Adams reference is totally inapplicable to these claims.

Claims 17, 37, 43, 56, and 57 include limitations to an optimization function. Although the purpose of Adams’ system is to optimize in real time a return to a previous plan, grafting this function on to the Simpson reference, or onto any of the cited references, is a xenotransplant performed solely in light of knowledge of the present invention. The overall system of the present invention is an interactive route optimizer that automatically generates an optimized route, but then permits a user to modify the route interactively until a balance is reached between objective optimality and subjective factors. Adams suggests only the objective half of this concept; neither Adams nor any other cited reference suggests that these two ideas could or even should be combined into a single system.

CONCLUSION

For the above reasons, Applicant urges that that all the claims presently in the Application are in condition for allowance. Applicant therefore respectfully requests that they be

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reexamined under 35 U.S.C. 132 and allowed. The Examiner is invited to telephone Applicant's attorney at 612- 373-6971 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 01-1125.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner of Patents, Washington, D.C. 20231 on August 10, 2000.

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